

LOLLIGUNCULA TYDEUS, A NEW SPECIES OF SQUID
(CEPHALOPODA; MYOPSIDA) FROM THE PACIFIC COAST
OF CENTRAL AMERICA

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ABSTRACT

A new species of myopsid squid, *Lolliguncula tydeus*, is described from the Eastern Pacific. It is compared to two other myopsids, *Lolliguncula brevis* and *Loliolopsis diomedae*. The new species is shown to be intermediate between *Lolliguncula* and *Loliolopsis* and it is suggested that these two genera are closely related. Some of the specimens were collected in brackish water which indicates that this, along with *Lolliguncula brevis*, is the second known euryhaline cephalopod.

While studying the cephalopods in the collections of the Rosenstiel School of Marine and Atmospheric Science, University of Miami, a number of loliginid squids were found that had been originally identified as *Loliolopsis diomedae* (Hoyle, 1904). Further study of these specimens led to the conclusion that they represented a new and undescribed species of the genus *Lolliguncula* (Steenstrup, 1881) and were the second species of that genus known from the Eastern Pacific.

The measurements and indices used in this work are as defined by Voss, 1963.

Lolliguncula tydeus, new species

Figures 1-2

Material Examined.—Holotype: ♂ mantle length 40 mm, MV West Point, Corinto, Nicaragua, night light, November 8, 1961. USNM 729950.

PARATYPES. Taken with the holotype—♀ mantle length 46 mm, USNM 729952. ♂ mantle length 32 mm, USNM 729951. 4♂, mantle lengths 26-35 mm, UMML 1748. ♂ mantle length 35 mm. Rio Anton, Gulf of Panama, April 1, 1957, UMML 1261.

OTHER MATERIAL. 53 immature specimens, mantle lengths 15-25 mm. Aca pulco, Mexico, March 26, 1957, UMML 1264.

Description.—The mantle is short, stout, cylindrical, and bluntly pointed posteriorly. The width is less than half the length (MWI, 30.0-33.5-35.3). The anterior margin is wide, somewhat flaring, and has a distinct dorsal lappet marking the anterior end of the gladius. The ventral margin is excavated below the funnel, with pointed angles marking the location of the mantle-funnel locking apparatus.

The fins are large and roughly elliptical in outline. Their length is about half the mantle length (FLI, 38.5-46.0-50.0; FWI, 60.0-64.1-67.6).

The head is small, about half as long as it is wide (HWI, 25.0-28.8-31.4), and has large eyes.

The funnel is short, stout, and free for about half its length. The mantle-funnel locking apparatus is simple and straight. The dorsal member of the funnel organ is \wedge shaped with small oval ventral pads.

The buccal membrane is 7-lobed, with supports attached dorsally on arms I and II and ventrally on arms III and IV. Each lobe has from 1 to 4 ringed suckers.

The arms are moderately short and in the order IV.III.II.I, pairs I and III with strong swimming membranes. Dorsal and ventral protective membranes border the suckers on all of the arms.

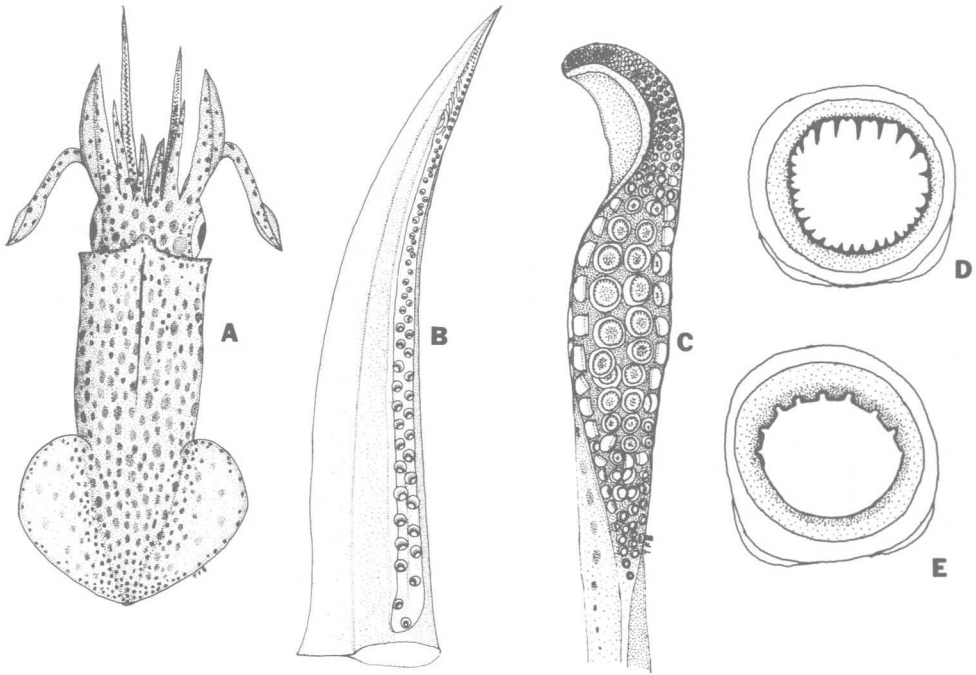


Figure 1. *Lolliguncula tydeus* new species. A, dorsal view of male holotype; B, hectocotyzed left ventral arm of same; C, left tentacular club from male, 35 mm mantle length; D, large tentacular sucker of same; E, sucker from arm III row 8 of female, 46 mm mantle length.

The left ventral arm is hectocotyzed in the male. Proximally there are about 26 to 30 pairs of normal suckers that gradually decrease in size. These suckers are often crowded together and may appear to form one row. In the distal $\frac{1}{4}$ of the arm, at approximately the 29th sucker, the pedicles in the dorsal row are modified into long, slender, fleshy papillae (HCLI, 11.4–12.8–14.7). There are about 19 to 21 pairs of suckers in the modified portion of the arm. The suckers of the ventral row are unmodified. The hectocotyzed arm is significantly longer than its unmodified fellow arm (13.3%–26.4%–33.3%). The length of the modified portion of the arm was measured from the base of the last unmodified sucker to the arm tip.

The arm suckers are in two rows and are of medium size. Their dentition consists of approximately nine broad, bluntly rounded teeth on the distal half and none of the proximal half. No obvious sexual dimorphism was found in either the size or the dentition of the suckers. The arm sucker measurements (sucker diam. III) were all taken from row seven of right arm III.

The tentacles are short and compressed, with dorsal keels that expand into swimming membranes at the base of the clubs. Orally, there is a median groove that extends to the club where it diverges to form the two strong protective membranes with their supports. There is a distinct manus and dactylus but no distinguishable carpus. There are about 32 to 36 transverse rows of suckers arranged in four longitudinal rows. The suckers of the manus are enlarged, with the suckers of the marginal rows about $\frac{2}{3}$ the size of the median ones. The chitinous sucker rings have regularly sized pointed teeth that are longest on the distal side of the median suckers and on the outer side of the marginal suckers.

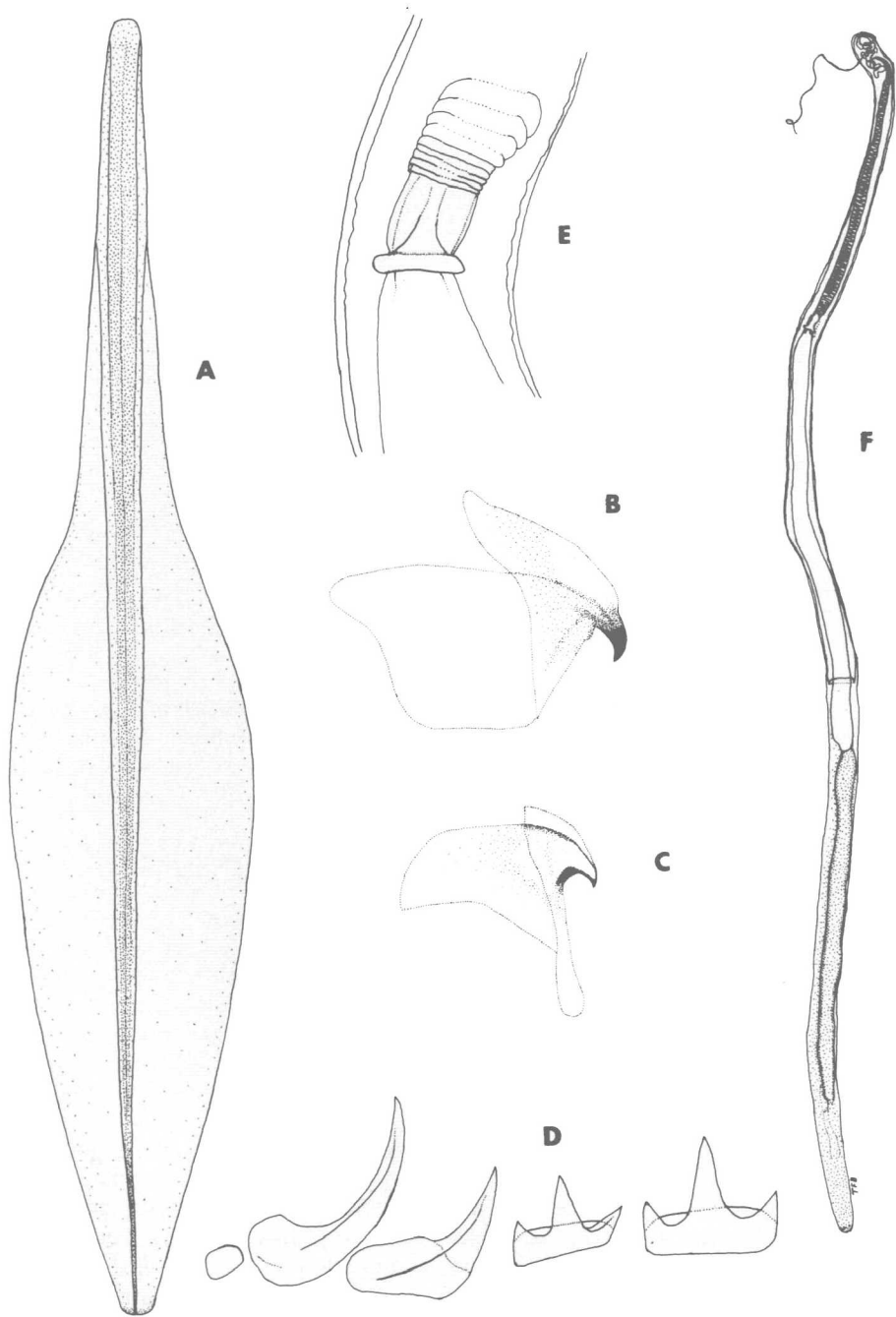


Figure 2. *Lolliguncula tydeus*, new species. A, gladius, total length 45 mm from female; 46 mm mantle length; B, C, mandibles from same; D, radula from male, 35 mm mantle length; E, details of midportion of spermatophore from male, 34 mm mantle length; F, spermatophore, 5.1 mm length total, from same.

Table 1. Measurements (in mm) of eight specimens of *Lolliguncula tydeus* new species

	Holotype							
	♀	♂	♂	♂	♂	♂	♂	♂
Mantle length	46	40	35	35	34	32	31	26
Mantle width	17	12	12	12	12	11	10	9
Head width	12	10	11	9	10	10	9	8
Fin length	22	18	17	15	17	16	15	10
Fin width	32	24	23	22	23	21	21	16
Arm length I	8	7	6	7	7	5	5	4
Arm length II	15	14	14	12	13	11	12	9
Arm length III	15	14	14	12	13	11	12	9
Arm length IV r	16	16	16	15	15	13	12	10
Arm length IV l	16	21	21	17	20	17	15	12
Hectocotylus length	—	5	5	4	5	4	4	3
Tentacle length	23	19	20	22	17	14	15	11
Club length	11	8	9	10	7	8	7	6
Sucker Diam. III	.8	.6	.6	.7	.6	.5	.4	.4
Tent. sucker diam. L	.7	.6	.7	.7	.5	.6	.4	.4
Tent. sucker diam. S	.3	.2	.2	.2	.2	.2	.15	.1
Gladius length	45	—	34	—	34	33	31.5	—
Gladius width	8	—	5.6	—	5.4	5.5	5.3	—
Vane length	36	—	27.7	—	27.5	26.5	25.5	—
Rachis width	1.9	—	1.3	—	1.5	1.4	1.4	—

The large female had no eggs and no spermatophore pad could be located.

The beaks were dissected out and are shown in Figure 2. The radula was extracted, mounted in CMC-10 and is shown in Figure 2. The spermatophores are small and slender (Fig. 2).

Type Locality.—Corinto, Nicaragua. *Etymology*.—The specific name *tydeus* is derived from the name of the Greek hero, Tydeus, who was the father of Diomedes.

Discussion.—Several specimens of *Lolliguncula tydeus* were originally identified as *Loliolopsis diomedae* (Hoyle, 1904). The reason for this misidentification is the presence of an elongated hectocotylized arm in *Lolliguncula tydeus*, a character that also occurs in *Loliolopsis diomedae*, but in no other myopsid. However, *Lolliguncula tydeus* shows no modification of the right ventral arm as does *Loliolopsis diomedae* and has two rows of suckers along the entire length of the hectocotylized arm. Males of *Loliolopsis diomedae* have a large flap on the right ventral arm; the left ventral arm has only five or six rows of suckers basally after which it is devoid of normal suckers. The left ventral arm also has a groove extending to the distal ¼ of the arm where the suckers of the dorsal row reappear as long, fleshy papillae. From my observations, I believe that the hectocotylized arm of *Lolliguncula tydeus* is intermediate between those of *Loliolopsis diomedae* and *Lolliguncula brevis* (Blainville, 1823) the type of the genus. As the only male specimen of *Lolliguncula panamensis* (Berry, 1911) available to me was immature and since *Lolliguncula brevis* is morphologically nearly identical to *Lolliguncula panamensis*, specimens of *Lolliguncula brevis* were used for comparison with the other species in question. The spermatophores and the gladius of *Lolliguncula tydeus* also appear to be somewhat intermediate between those of *Loliolopsis diomedae* and *Lolliguncula brevis*.

The above observations prompted further comparison of specimens of *Loliolopsis diomedae* and *Lolliguncula brevis*. As a result, I found that the spermato-

Table 2. Indices of bodily proportions of eight specimens of *Lolliguncula tydeus*, new species

	Holotype							
	♀	♂	♂	♂	♂	♂	♂	♂
Mantle length	46.0	40.0	35.0	35.0	34.0	32.0	31.0	26.0
MWI	36.9	30.0	34.3	34.3	35.3	34.4	31.3	34.6
HWI	26.0	25.0	31.4	25.7	29.4	31.2	28.1	30.8
FLI	47.8	45.0	48.6	42.8	50.0	50.0	46.9	38.5
FWI	69.6	60.0	65.7	62.9	67.6	65.6	65.6	61.5
ALI I	17.4	17.5	17.1	20.0	20.6	15.6	15.6	15.4
ALI II	26.1	22.5	31.4	28.6	26.5	25.0	25.0	23.1
ALI III	32.6	35.0	40.0	34.3	38.2	34.4	37.5	34.6
ALI IV r	34.8	40.0	45.7	42.9	44.1	40.6	37.5	34.5
ALI IV l	34.8	52.5	60.0	48.6	58.8	53.1	48.4	46.2
HcLI	—	12.5	14.3	11.4	14.7	12.5	12.5	11.5
TLI	50.0	47.5	51.1	62.9	50.0	43.8	46.9	42.3
CLI	23.9	20.0	25.7	28.6	20.6	25.0	21.9	23.1
ASI	1.7	1.5	1.7	2.0	1.8	1.6	1.3	1.5
TSI L	1.5	1.5	2.0	2.0	1.5	1.9	1.3	1.5
TSI S	.7	.5	.6	.6	.6	.6	.5	.4
GWl	17.4	—	16.0	—	15.9	17.2	17.1	—
VLl	78.3	—	79.1	—	80.9	82.8	82.3	—
RWl	4.1	—	3.7	—	4.4	4.4	4.5	—

phore pad of the female *Loliolopsis diomedae* is located on the inner surface of the mantle posterior to the left gill. It is deeper within the mantle than that of *Lolliguncula brevis*, and this may be the reason for the elongation of the hectocotylized arm in *Loliolopsis*. A similar pad was also found on the right side of females of *Loliolopsis diomedae*, although spermatophores were only found attached to the left pad. The presence of a spermatophore pad below the left gill is one of the generic characters of the genus *Lolliguncula*. I believe that the presence of a spermatophore pad below the left gill of *Loliolopsis*, combined with

Table 3. Ranges and means of indices of bodily proportions of seven males of *Lolliguncula tydeus* new species

Index	Range and Mean
Mantle length	26.0–33.3–40
MWI	30.0–33.5–35.3
HWI	25.0–28.8–31.4
FLI	38.5–46.0–50.0
FWI	60.0–64.1–67.6
ALI I	15.4–17.4–20.6
ALI II	23.1–26.0–31.4
ALI III	34.3–36.3–40.0
ALI IV r	34.5–40.8–45.7
ALI IV l	46.2–52.5–60.0
HCLI	11.4–12.8–14.7
TLI	42.3–49.2–62.9
CLI	20.0–23.6–28.3
ASI	1.3– 1.6– 2.0
TSI L	1.3– 1.7– 2.0
TSI S	.4– .5– .7
GWl	15.9–16.6–17.2
VLl	79.1–81.3–82.8
RWl	3.7– 4.3– 4.5

the discovery of a species that is somewhat intermediate between the two genera, indicates a close relationship between *Lolliguncula* and *Loliolopsis*.

Loliolopsis is a monotypic genus that is restricted to the tropical waters on the west coast of the Americas. *Lolliguncula* contains five species and is a genus which has representatives in each of the major tropical zoogeographic areas. The relationship discussed above indicates that *Loliolopsis* may have branched off from *Lolliguncula* and if so probably at some time since the closing off of the Isthmus of Panama since *Loliolopsis* is restricted to the Panamic area. I believe that *Loliolopsis* has differentiated sufficiently to warrant the retention of its generic standing.

A key to the species of *Lolliguncula* and *Loliolopsis* is given at the end of this paper.

The Nicaraguan specimens of *Lolliguncula tydeus* were collected in "extremely brackish water" (exact salinity not recorded). If this is in fact the case, *Lolliguncula tydeus* becomes the second cephalopod known to occur in waters of low salinity. The only other known euryhaline cephalopod is *Lolliguncula brevis* (Gunter, 1950; Voss, 1956; Moore, 1961); it inhabits waters of low salinity and has been maintained in tanks at salinities as low as 15‰ (Hanlon, 1978, personal communication). The fact that these two species of *Lolliguncula* inhabit waters of low salinity raises the question of the salinity tolerances of the other species in this genus as well as in the apparently closely related *Loliolopsis*. Since cephalopods are generally assumed to be strictly stenohaline the existence of a group of euryhaline cephalopods should be of great interest to cephalopod workers and the possible number of species that share this ability deserves further work. The existence of a group of euryhaline cephalopods also holds obvious implications in the field of paleoecology.

KEY TO THE SPECIES OF *LOLLIGUNCULA* AND *LOLIOLOPSIS*

- 1a. Both ventral arms of the male are modified, the right arm with a large ventral flap and the left elongated with only five or six rows of suckers basally; spermatophore pads on mantle below both gills of female; marginal suckers on manus of club greatly reduced; restricted to the tropical waters of the eastern Pacific..... *Loliolopsis diomedea*
- 1b. Only the left ventral arm modified in the male with rows of suckers along the entire length of the arm; single spermatophore pad below the left gill of the female *Lolliguncula* 2
- 2a. Restricted to the waters of the Americas 3
- 2b. Restricted to the tropical waters of Africa 5
- 3a. Restricted to the western Atlantic *Lolliguncula brevis*
- 3b. Restricted to the eastern tropical Pacific 4
- 4a. Hectocotylized arm about equal in length to its fellow arm *Lolliguncula panamensis*
- 4b. Hectocotylized arm noticeably elongated *Lolliguncula tydeus*
- 5a. Restricted to the tropical waters of west Africa *Lolliguncula mercatoris*
- 5b. Restricted to the tropical waters of east Africa *Lolliguncula abulati*

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